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Parkmet An Android Based Smart Parking: A Review

Prof. Chaudhari. V. S , Dangat Gayatri , Gondhane Sakshi, Rayakr Shital
Students and Professor, Department of Computer Engineering
Vishwabharti Academy's College of Engineering, Ahmednagar, Maharashtra
Savitribai Phule Pune University, Pune

Abstract: *As urban areas grow and vehicle usage increases, finding available parking spaces in large lots has become increasingly difficult, leading to delays, frustration, and inefficient space utilization. Traditional parking systems often rely on manual processes or basic digital solutions, which lack essential features like offline navigation, structured (sequential) parking, and flexible slot reservations-key elements for a smooth user experience. ParkMate, an Android-based application, addresses these challenges by improving the efficiency and user-friendliness of parking management in high-traffic areas. ParkMate utilizes a QR-based system for advance slot reservations, streamlining access and reducing congestion. Upon arrival, users receive a digital receipt confirming their reservation and parking location. The app's offline navigation feature enables users to find their vehicle without needing internet access, especially useful in areas with limited connectivity. Additionally, ParkMate supports sequential parking. guiding users to specific slots in a structured manner to optimize space usage. By offering a hybrid of offline functionality and digital conveniences, PurkMate improves traditional parking systems, enhancing operational efficiency and user satisfaction in large urban parking facilities.*

Keywords: ParkMate, Parking management, QR-based reservation, Offline navigation, Sequential parking, Urban mobility, Android application, Parking optimization, User experience, Smart parking systems

I. INTRODUCTION

The need for effective parking solutions in sizable establishments like shopping malls, office buildings, and transit hubs has grown dramatically due to the quick rise in urban population and car ownership. However, customers frequently encounter difficulties navigating these large lots, which can result in lengthy search times, trouble finding parked cars, and frequent irritation. Essential elements like real-time navigation, slot reservation, and structured space management are absent from traditional parking systems, which are usually based on manual ticketing or simple digital installations. Although the experience has been enhanced by digital parking solutions, these systems frequently rely on constant internet access and lack well-organized, effective parking layouts. Recent advancements in parking technology have introduced automated systems aimed at addressing these issues. However, many still fall short, lacking comprehensive features like offline navigation, sequential parking allocation, and advance booking—key functionalities for managing high-traffic environments. As smart city initiatives continue to expand, there is a clear need for parking systems that can operate independently of network access, optimize space usage, and deliver a smooth, user-friendly experience. This review paper presents ParkMate, an Android-based parking management system designed for large, high-traffic lots. ParkMate addresses the limitations of existing solutions by offering QR-based slot booking, sequential space allocation, and offline navigation. These features enhance both user convenience and operational efficiency. By exploring the challenges of current parking systems and examining ParkMate's unique contributions, this paper highlights how ParkMate can serve as an efficient and practical solution for modern parking facilities

II. PROPOSED SYSTEM

ParkMate is an Android-based parking management system designed to optimize parking in large facilities, addressing common challenges like inefficient space utilization, long search times, and difficulty locating parked vehicles. The

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system integrates key features that improve user convenience, operational efficiency, and overall parking experience:

1. QR-Based Slot Booking
ParkMate allows users to reserve parking spaces in advance using QR codes. This simplifies entry, payment, and ticketing, eliminating the need for manual processes. The QR code provides a smooth, efficient way for users to secure a spot and gain quick access to the parking lot.

2. Navigation
The app offers real-time navigation, guiding users to available parking spots and helping them easily locate their parked vehicles. This reduces confusion, especially in large parking lots, and ensures that users find their spots quickly.

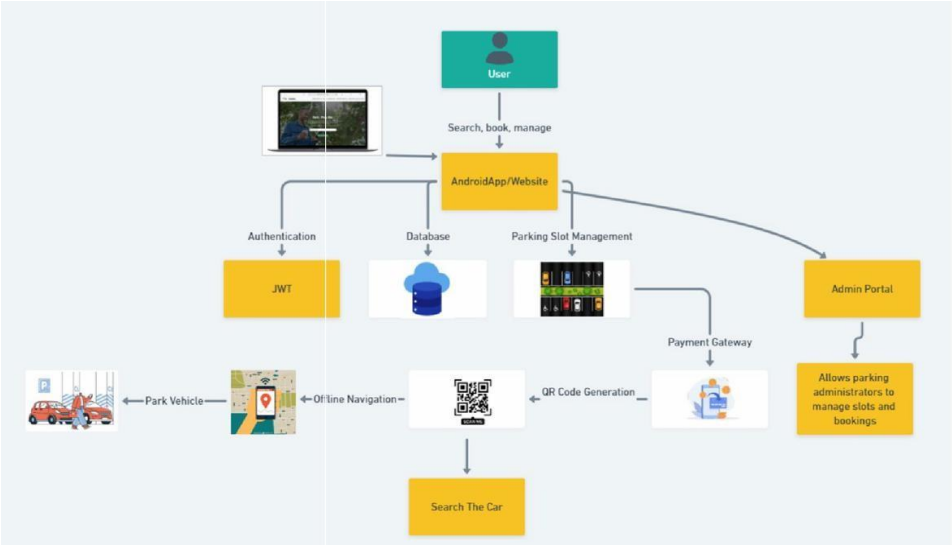
3. Sequential Parking Allocation
ParkMate allocates parking spots in a sequential manner, maximizing space utilization and minimizing search times. By avoiding random parking, this system ensures that vehicles are parked in an orderly fashion, increasing parking lot capacity and reducing congestion.

4. User-Friendly Interface
With an intuitive, simple interface, ParkMate makes it easy for users to navigate the app and complete various tasks, such as booking a parking spot, making payments, and finding their vehicle. The interface ensures a smooth and seamless user experience, suitable for all types of users.

5. Scalability
Designed to be adaptable, ParkMate can scale to suit a wide range of parking facilities, from small retail parking lots to large, multi-level parking structures. It integrates seamlessly with existing infrastructure, allowing for easy expansion and future growth.

6. Security
Security is a top priority, with encrypted user data and secure payment processing. The app ensures the safety of user payment details, providing peace of mind during transactions.

III. SYSTEM ARCHITECTURE



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IV. SYSTEM REQUIREMENTS

Hardware Requirements Smartphone:

• Platform: Android OS (version 6.0 and above)
• Processor: Minimum Quad-core processor (1.5 GHz or higher)
• RAM: 2 GB or more
• Storage: 50 MB of available storage space for the app
• GPS: Required for real-time navigation and parking spot location tracking
• Camera: For QR code scanning

Software Requirements Operating System

Android OS (version 6.0 or later)
App Requirements:
Android App
MySQL, PostgreSQL, or Firebase
Google Pay, PayPal, or Credit/Debit Card Payment Gateway

V. ADVANTAGES OF SMART PARKING

• Convenience: Using applications or real-time displays, drivers may quickly locate open parking spots, saving them time.
• Efficiency: By optimizing parking lot usage, smart solutions create more available spaces and reduce traffic.
• Diminished Emissions: Lower fuel use and emissions result from less time looking for parking.
• Security: Since automated payment systems do not need currency handling, there is a decrease in fraud.
• Data-driven Management: Parking authorities can better allocate resources and set prices thanks to the useful information they obtain about usage trends.

VI. ALGORITHM 1: TO FIND THE NEIGHBOR TABLE

1. User log in to the system
2. The user reaches any node of the parking network.
3. The user sends the request to the server through the roadside units
4. Each immediate neighbor will share the information.
5. All the nodes will enter the distance of their neighbors in a table.
6. All nodes will share their table with the source node

VII. CONCLUSION

ParkMate provides a complete answer to the problems associated with large parking lot management. The system greatly enhances user experience and operational efficiency by incorporating features like real-time navigation, sequential parking allocation, QR-based slot booking, and seamless payment alternatives. While protecting user data, its scalability and security features guarantee adaptability to different parking settings. The system's dependability is further increased by its offline functionality for essential features. All things considered, ParkMate offers a creative and approachable method of contemporary parking management, which makes it the perfect choice for parking lots with heavy traffic.

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